Serial No. 09/598,890

REMARKS

The drawings and substitute specification have been objected to and various claims have been rejected under 35 USC 112 for the reasons stated in section 4-9 on pages 2-5 of the Office Action and by this Amendment After Final and separately submitted Proposed at Drawing Revisions letter, the entire application has been revised so as to overcome the Examiner's objections and rejections under 35 USC 112.

Claims 32-46 and 51-55 have been withdrawn from consideration as being directed to a non-elected invention in that the Examiner argues that the method of these claims do not require the specific or identical structure of the apparatus claims. By this Amendment, these claims have been amended so as to now be fully commensurate with the apparatus claims and accordingly, it is respectfully requested that these claims be considered along with the apparatus claims.

The Examiner has indicated that claims 17-31 and 47-50 would be allowable if rewritten or amended so as to overcome their rejection under 35 USC 112 and accordingly, it is submitted that these claims should now be in a condition suitable for allowance.

Furthermore, as noted above, claims 32-46 and 51-55 have been amended so as to now be fully commensurate with the allowable apparatus claims and accordingly, it is submitted that these claims should also now be in a condition suitable for allowance.

To the extent necessary, please charge any shortage in fee due in connection with this filing to Deposit Account No. 07-1337 and please credit any excess fees to such deposit account.

No other issues remaining, reconsideration and favorable action upon all of the claims now present in the application is respectfully requested.

Respectfully submitted,

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VERSION OF AMENDED SPECIFICATION
SHOWING CHANGES MADE

Page 7, first full paragraph, please amend to read:

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The basic required components for such a microchip system are shown in Fig. 1. They are basically divided into systems that have a material flow 1, and systems that represent an information flow 2 that occurs during an experiment. In the area of the material flow 1, means are necessary to supply 3 and transport 4 substances on the chip, and means are required to treat or pretreat 5 the investigated substances. Furthermore, sensors are required for detection 6 of the results of an experiment. The arising flow of information is essentially for controlling the transport of substance on the chip using, e.g., control electronics 7. In addition, a flow of information occurs while processing the signals <u>in the signal processing step</u> 8 of the detected measured results, and especially while evaluating or interpreting them 9. Additional needed transport steps 4', 4'', and 4''' are also shown.

Page 6, first full paragraph:

In addition, micromechanical or micro-electromechanical sensors are presently being considered for use in the cited area of microfluid technology, e.g., micromechanical valves, motors or pumps. A corresponding perspective on possible future technologies in this field is provided by a relevant article by Caliper Technologies Corporation.[that can be retrieved on the Internet at <u>www.Calipertech.com</u>.]

Page 9, second full paragraph:

In addition, a first coder can be on the supply element for identification that interacts with a corresponding second coder on the <u>corresponding</u> supplier. This measure makes the device

according to the invention particularly safe to use since it effectively prevents a supplier incompatible with the supply element from being accidentally used or installed. To further increase operational reliability, a magnetic sensor (especially a Hall sensor) can be provided to identify the supply elements, or a shut-off device or warning device that works with the sensor can be provided.

Page 11, first full paragraph:

The substances to be investigated (possibly along with the required reagents for the respective experiment) are first fed to a supply area [3] of the microchip where the material is to flow. Then the substances are moved or transported 4 on the microchip (e.g., by means of electrical force in the case of ionized substances). Both the supply and the movement of the substances are effected by suitable control electronics 7 as indicated by the dashed line. In the present example, the substances are pretreated 5 before they are subjected to the actual experiment. They can be, e.g., pre-heated by a heater, or pre-cooled by a suitable cooling device to precisely reproduce the thermal test conditions. Of course, the temperature of a chemical experiment normally substantially influences the experimental kinetics. As indicated by the arrow, this pretreatment can also be sequential, whereby a pretreatment [cycle] <u>step</u> 5 and another transport [cycle] <u>step</u> 4' are correspondingly triggered. The cited pretreatment is particularly useful for separating substances so that only specific components of the starting substance will be available for the respective experiment. Basically, both the amount of substance (quantity) as well as the rate of the substance (quality) can be determined by the described means of transport. In particular, by precisely setting the amount

of substance, the individual substances or substance components can be precisely dosed. The last-cited procedures are also preferably controlled by means of the control electronics 7.

Page 11, second full paragraph:

The actual experiment may occur after several pretreatments; the experimental results can be detected 6 at a suitable detection point on the microchip. The means of detection are preferably optical, e.g., a laser diode is used together with a photocell, or a conventional mass spectrometer. The resulting optical measurement signals are sent to a signal-processing device <u>for processing signal</u> in step 8 and then to an evaluation unit (e.g. a suitable microprocessor) for interpretation 9 of the measurement results.

Page 14, second full paragraph:

Optional recesses 54 can be provided to accept substances, especially reagents. In addition, a second assembly 55 is provided that contains the required supply [equipment] <u>device</u> 56 for operating the microchip 52. By suitably miniaturizing the required components, the supply [equipment] <u>device</u> 56 preferably represents a microsystem that provides the required electrical voltage or compressed medium via corresponding electrodes 58 (or lines 58 for a pressure supply system) in the form of a cartridge that can be inserted in the assembly 55. If the microchip is supplied with electricity, the electrical voltage supply can be miniaturized using conventional integrated circuitry; if pressure is supplied, the miniaturization can be provided by corresponding techniques familiar in the fields of modern laboratory technology or micromechanics. The supply containers for the compressed gas can also be integrated since, as mentioned, the required gas volume is in the picoliter range.

Page 15, first full paragraph:

In the shown exemplary embodiment, the supply element according to the invention has electrical linkages 60 or connecting channels that bridge the electrodes 58 or the channels of the supply device 56 and the [assigned counter electrodes] <u>recesses</u> 53 of the microchip. On one hand, the bridging serves to prevent wear and soiling of the supply device 56 electrodes

that arises when the microchip is contacted such that the supply element basically assumes this function as a disposable product. As shown in the present exemplary embodiment, the supply element can also serve to spatially adapt the supply device 56 electrodes to the respective surface or spatial arrangement of the microchip's electrode surfaces. The entire measuring and operating device can be advantageously adapted to a special microchip layout just by exchanging the [cartridge] <u>supply device</u> 56 and/or the supply element 57. In particular, by exchanging the entire [cartridge] <u>supply device</u>, the handling device can be quickly and easily adapted to different test series or types of operation, as for example when changing from an electrical to pressure supply of the microchip.

Page 16, first full paragraph:
In the embodiment of Figs. 4a1 and 4b1, the supply lines (hollow tubes or hollow channels) 70 [to] <u>which</u> transfer substances are designed as capillaries or cavities that extend above the interface element with reference to the side surfaces of the interface element. The supply lines 70 are sealed with a chemically resistant substance, such as wax, filling compound, etc. at their ends 79 and hence can be sealed so as to be air- and gas-tight.

Page 19, first full paragraph:
In addition, first coders 100, 100' are provided in the present exemplary embodiment that operate according to the pin/hole principle to identify the supply element, and they work together with a corresponding second coders 101, 101' on the supply equipment. The coders 100, 100', 101, 101' ensure that only a supply element compatible with the <u>corresponding</u> supplier can be used or, respectively, inserted in the cartridge 80. In particular, to further increase operational reliability, a magnetic sen
sor (not shown), especially a Hall sensor, can be provided to identify the supply element, and a shut-off device or warning device that works with the sensor can also be provided. Let it be stated that in addition to the shown embodiment that uses a pin and hole, other coders can be used such as electrical/magnet coding or the recognition of corresponding ID chip cards, or an optical coding, e.g. a color code, bar code, etc.

Docket No.: 4481-022

17. (Amended) A supply element for a laboratory microchip with a microfluid structure for at least one of chemical, physical, or biological processing, ~~the~~ microchip having a first supplier to supply substances to the microchip and a second supplier to supply a potential to the microchip to move substances corresponding to the microfluid structure, the supply element comprising:

at least one substance-containing first supplier adapted to contain a substance, said at least one first supplier having a seal arranged to be opened to the microchip in response to the supply element and the microchip being joined together to enable said substance to be transferred from said at least one first supplier to a second supplier disposed within the microchip.

18. The supply element of claim 17, wherein said seal of said at least one first supplier of the supply element comprises a chemically resistant substance.

19. The supply element of claim 17, wherein said seal of said at least one first supplier of the supply element comprises a wax.

20. The supply element of claim 17, wherein said at least one [third] first supplier of the supply element comprises at least one end sealed by a membrane that is flush with a side surface of the supply element.

23. The supply element of claim 17, wherein said substance of said [third] first supplier of the supply element comprises at least one substance sample.

24. The supply element of claim 17, wherein said substance of said [third] first supplier of the supply element comprises at least one substance reagent.

25. The supply element of claim 17, wherein said substance of said [third] first supplier of the supply element comprises at least one substance sample and at least one substance reagent.

26. (Amended) The supply element of claim 17, further comprising a ~~fourth~~ third supplier to transfer ~~the~~ a potential to the microchip, said ~~fourth~~ third supplier of the supply element being arranged to be coupled to ~~the~~ a corresponding ~~second~~ fourth supplier ~~on~~ disposed within the microchip.

30. (Amended) The supply element of claim 17, further comprising first and second assemblies, said first assembly ~~being~~ including a module adapted to ~~contain a module carrying~~ carry said supply element and supply equipment and said module being adapted to be releasably connected to said second assembly.

31. (Amended) The supply element of claim 17, wherein said seal of said at least one ~~third~~ first supplier of the supply element is adapted to be pierced by an end of said ~~first~~ second supplier of the microchip to enable said substance to be transferred from said at least one ~~third~~ first supplier of the supply element to the ~~first~~ second supplier of the microchip.

32. (Amended) A method of operating a supply element for a laboratory microchip with a microfluid structure for at least one of chemical, physical, or biological processing, the method comprising:

______supplying substances to the microchip with a first supplier disposed within the microchip;

supplying a potential to the microchip with a second supplier disposed within the microchip to move substances corresponding to the microfluid structure,

containing a substance in at least one substance-containing third supplier disposed within the supply element;

opening a seal in said at least one third supplier of the supply element ~~to the microchip~~ in response to the supply element and the microchip being joined together; and

transferring said substance from said at least one third supplier of the supply element to the first supplier of the microchip.

33. (Amended) The method of claim 32, wherein opening said seal of said at least one third supplier of the supply element comprises opening a seal comprising a chemically resistant substance.

34. (Amended) The method of claim 32, wherein opening said seal of said at least one third supplier of the supply element comprises opening a seal comprising a wax.

35. (Amended) The method of claim 32, further comprising sealing at least one end of at least one third supplier of the supply element with a membrane that is flush with a side surface of the supply element.

36. (Amended) The method of claim 35, wherein sealing at least one end of at least one third supplier of the supply element with a membrane comprises sealing with a membrane comprising a chemically resistant material.

37. (Amended) The method of claim 35, wherein sealing at least one end of at least one third supplier of the supply element with a membrane comprises sealing with a membrane comprising one of a metal or a gas-permeable polymer.

38. (Amended) The method of claim 32, wherein containing a substance in at least one substance-containing third supplier of the supply element comprises containing at least one substance sample.

39. (Amended) The method of claim 32, wherein containing a substance in at least one substance-containing third supplier of the supply element comprises at least one substance reagent.

40. (Amended) The method of claim 32, wherein containing a substance in at

least one substance-containing third supplier of the supply element comprises containing at least one substance sample and at least one substance reagent.

41. (Amended) The method of claim 32, further comprising coupling a fourth supplier disposed within the supply element to the corresponding second supplier ~~on~~ of the microchip and transferring ~~the~~ a potential from the fourth supplier of the supply element to the second supplier of the microchip.

42. (Unchanged) The method of claim 32, further comprising releasably attaching the supply element to supply equipment.

43. (Unchanged) The method of claim 42, wherein releasably attaching the supply element to supply equipment comprises comprises releasably attaching with a bayonet lock.

44. (Unchanged) The method of claim 32, further comprising identifying the supply element to a second corresponding coding arrangement of supply equipment with a first coding arrangement.

45. (Unchanged) The method of claim 32, further comprising containing a module carrying said supply element with a first assembly and releasably connecting said module to said second assembly with a second assembly.

46. (Amended) The method of claim 32, further comprising piercing said seal of said at least one third supplier of the supply element with an end of said first supplier of the microchip and transferring said substance to be transferred from said at least one third supplier of the supply element to the first supplier of the microchip.

47. A supply element combined with a laboratory microchip, the combination comprising:

a microfluid structure disposed within the microchip and adapted for at least one of chemical, physical, or biological processing;

a first supplier disposed within the microchip and adapted to supply substances to the microchip;

a second supplier disposed within the microchip and adapted to supply a potential to the microchip to move substances corresponding to the microfluid structure; and

at least one substance-containing third supplier disposed within the supply element and adapted to contain a substance, said at least one third supplier of the supply element having a seal arranged to be opened to the microchip in response to the supply element and the microchip being joined together to enable said substance to be transferred from said at least one third supplier of the supply element to the first supplier of the microchip.

48. The supply element combined with a laboratory microchip of claim 47,

further comprising a fourth supplier disposed within the supply element to transfer the potential to the microchip, said fourth supplier being arranged to be coupled to the corresponding second supplier of the microchip.

49. The supply element combined with a laboratory microchip of claim 47, further comprising first and second assemblies, said first assembly including a module adapted to carry said supply element and supply equipment and said module of said first assembly being adapted to be releasably connected to said second assembly.

50. The supply element combined with a laboratory microchip of claim 47, wherein said seal of said at least one third supplier of the supply element is adapted to be pierced by an end of said first supplier of the microchip to enable said substance to be transferred from said at least one third supplier of the supply element to the first supplier of the microchip.

51. A method of operating a supply element combined with a laboratory microchip, the method comprising:

providing the laboratory microchip with a microfluid structure adapted for at least one of chemical, physical, or biological processing;

supplying substances to the microchip with a first supplier disposed within the microchip;

supplying a potential to the microchip with a second supplier disposed within the microchip to move substances corresponding to the microfluid structure;

containing a substance in at least one substance-containing third supplier disposed within the supply element;

opening a seal in said at least one third supplier of the supply element to the microchip in response to the supply element and the microchip being joined together; and

transferring said substance from said at least one third supplier of the

supply element to the first supplier of the microchip.

52. The method of claim 51, wherein opening said seal in said at least one third supplier comprises opening a seal comprising a chemically resistant substance.

53. The method of claim 51, further comprising sealing at least one end of at least one third supplier of the supply element with a membrane that is flush with a side surface of the supply element.

54. The method of claim 53, wherein sealing at least one end of at least one third supplier of the supply element with a membrane comprises sealing with a membrane comprising a chemically resistant material.

55. The method of claim 53, wherein sealing at least one end of at least one third supplier of the supply element with a membrane comprises sealing with a membrane comprising one of a metal or a gas-permeable polymer.